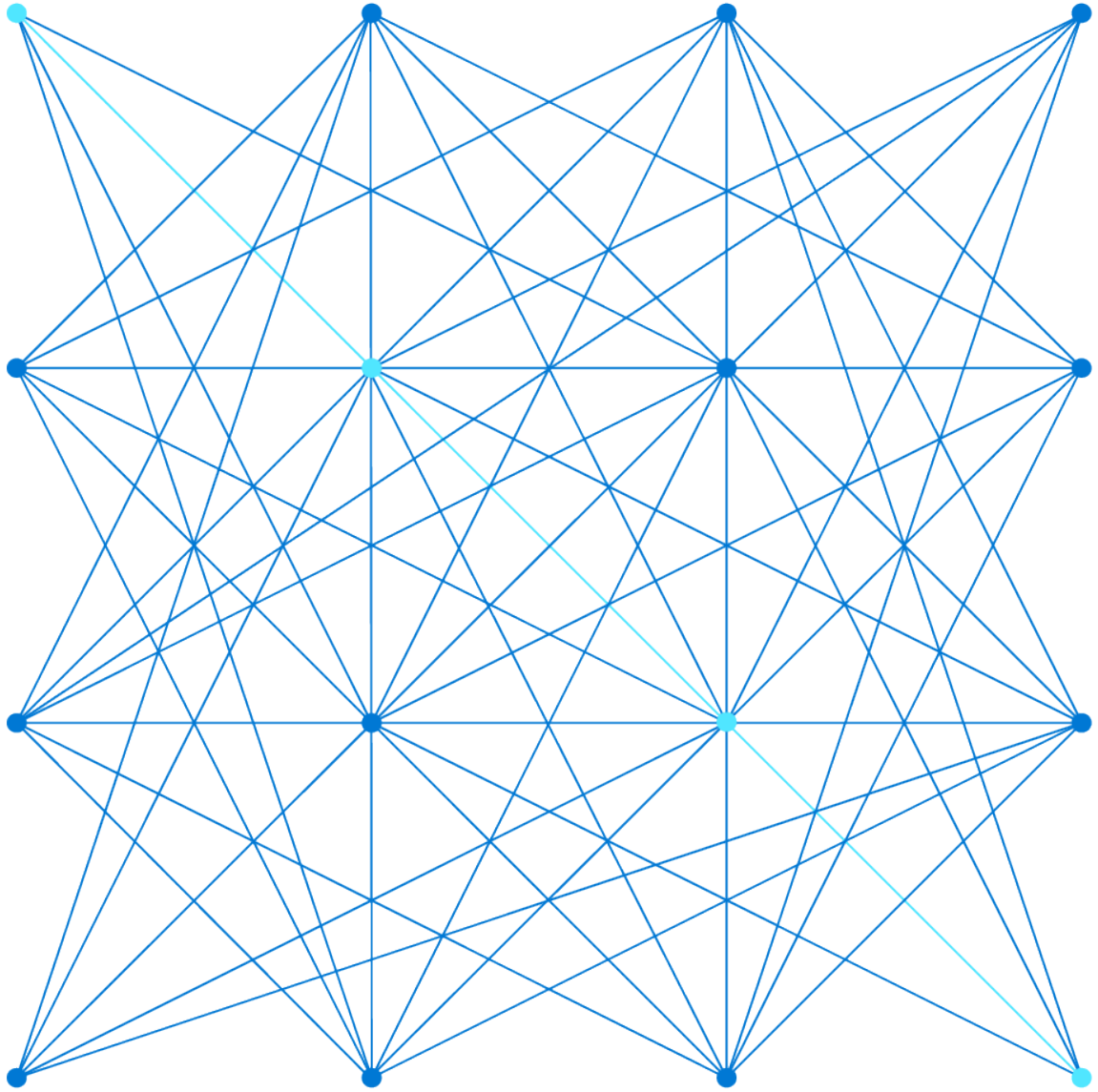
Microsoft Azure

3: Explore fundamentals of non-relational data in Azure



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Agenda

Fundamentals of Azure Storage

Fundamentals of Azure Cosmos DB

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1: Fundamentals of Azure Storage

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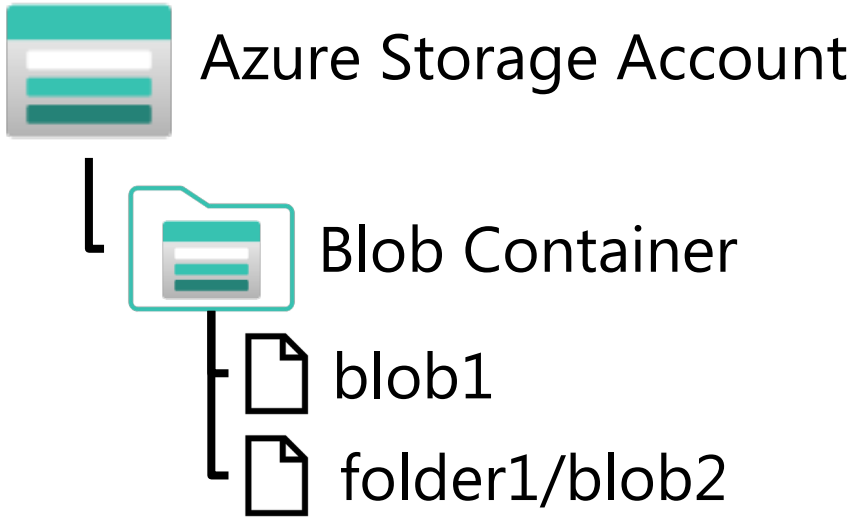
Azure Blob Storage

Storage for data as binary large objects (BLOBs)

- Block blobs
  - Large, discrete, binary objects that change infrequently
  - Blobs can be up to 4.7 TB, composed of blocks of up to 100 MB
    - A blob can contain up to 50,000 blocks
- Page blobs
  - Used as virtual disk storage for VMs
  - Blobs can be up to 8 TB, composed of fixed sized-512 byte pages
- Append blobs
  - Block blobs that are used to optimize append operations
  - Maximum size just over 195 GB - each block can be up to 4 MB

Per-blob storage tiers

- Hot – Highest cost, lowest latency
- Cool – Lower cost, higher latency
- Archive – Lowest cost, highest latency



Blobs can be organized in virtual directories, but each path is considered a single blob in a flat namespace – folder level operations are not supported

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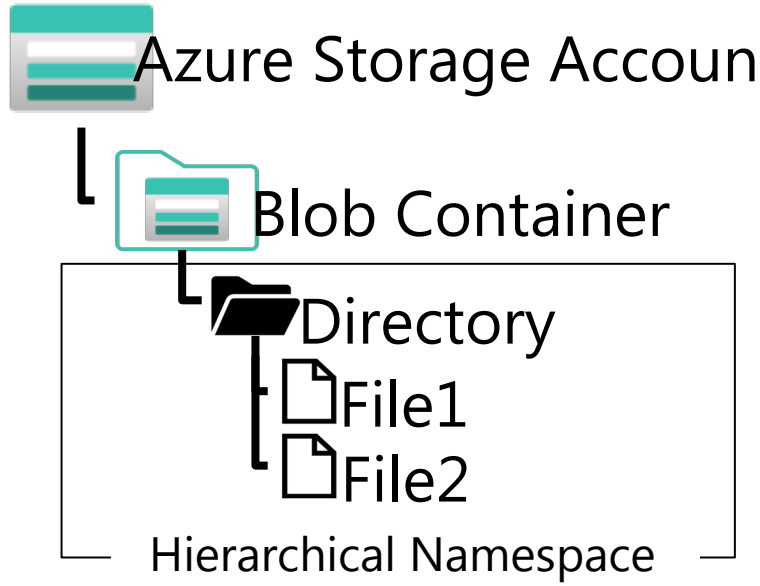
Azure Data Lake Store Gen 2

Distributed file system built on Blob Storage

- Combines Azure Data Lake Store Gen 1 with Azure Blob Storage for large-scale file storage and analytics
- Enables file and directory level access control and management
- Compatible with common large scale analytical systems

Enabled in an Azure Storage account through the *Hierarchical Namespace* option

- Set during account creation
- Upgrade existing storage account
  - One-way upgrade process



File system includes directories and files, and is compatible with large scale data analytics systems like Hadoop, Databricks, and Azure Synapse Analytics

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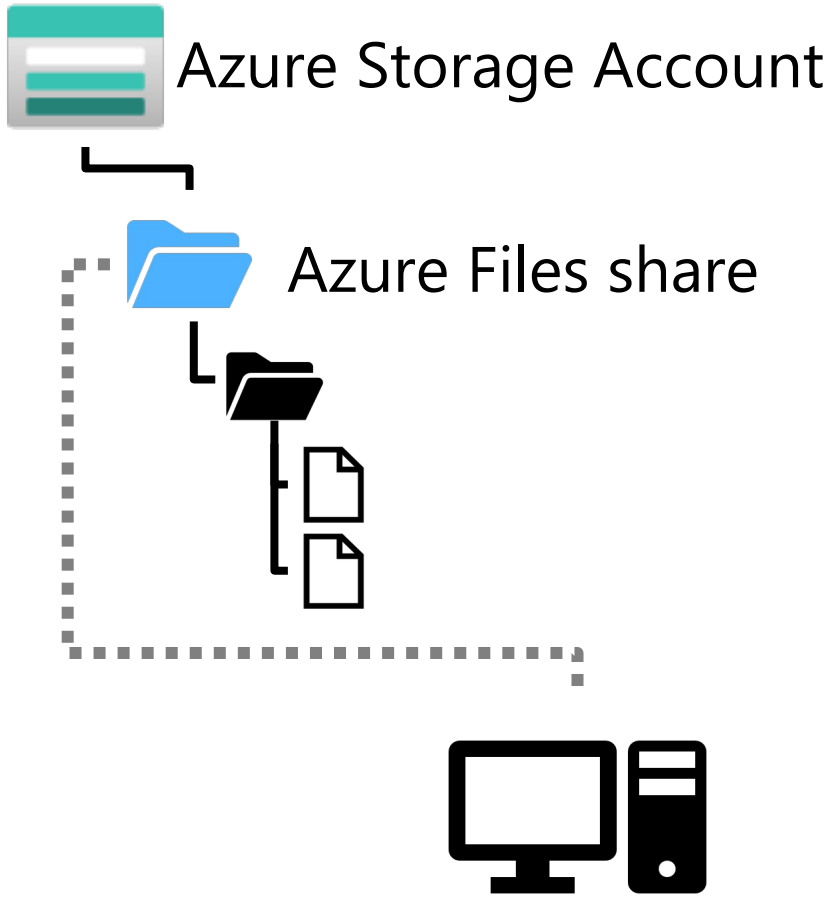
Azure Files

Files shares in the cloud that can be accessed from anywhere with an internet connection

- Support for common file sharing protocols:
  - Server Message Block (SMB)
  - Network File System (NFS) – *requires premium tier*
- Data is replicated for redundancy and encrypted at rest



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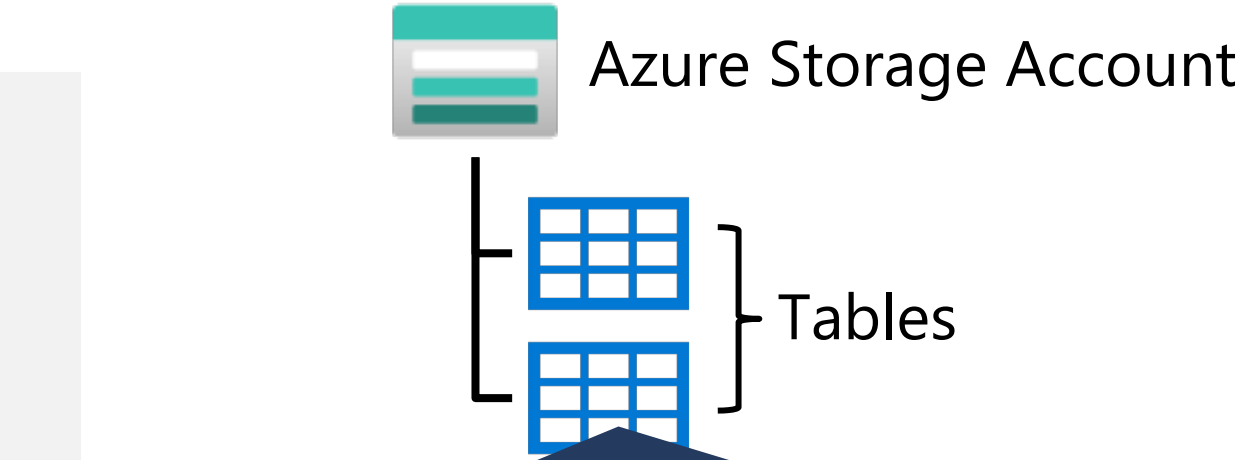
Azure Table Storage

Key-Value storage for application data

- Tables consist of *key* and *value* columns
  - Partition and row keys
  - Custom property columns for data values
    - A *Timestamp* column is added automatically to log data changes
- Rows are grouped into partitions to improve performance
- Property columns are assigned a data type, and can contain any value of that type
- Rows do not need to include the same property columns



PartitionKey	RowKey	Timestamp	Property1	Property2
1	123	2022-01-01	A value	Another value
1	124	2022-01-01	This value	
2	125	2022-01-01		That value

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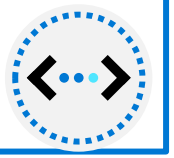
Lab: Explore Azure Storage

In this lab, you will provision and use Azure Storage

1. Start the virtual machine for this lab
   or go to the exercise page at https://aka.ms/dp900-storage-lab
2. Follow the instructions to complete the exercise on Microsoft Learn
   Use the Azure subscription provided for this lab



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1: Knowledge check

What are the elements of an Azure Table storage key?

- ❑ Table name and column name
- ☑ Partition key and row key
- ❑ Row number

What should you do to an existing Azure Storage account in order to support a data lake for Azure Synapse Analytics?

- ❑ Add an Azure Files share
- ❑ Create Azure Storage tables for the data you want to analyze
- ☑ Upgrade the account to enable *hierarchical namespace* and create a blob container

Which Azure Storage option should use to create cloud-based network file shares?

- ❑ Azure Blob Storage
- ❑ Azure Tables
- ☑ Azure Files

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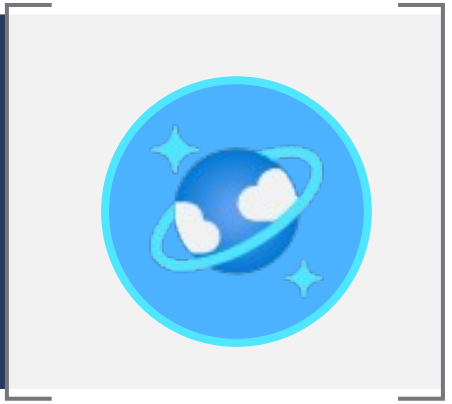
2: Fundamentals of Azure Cosmos DB



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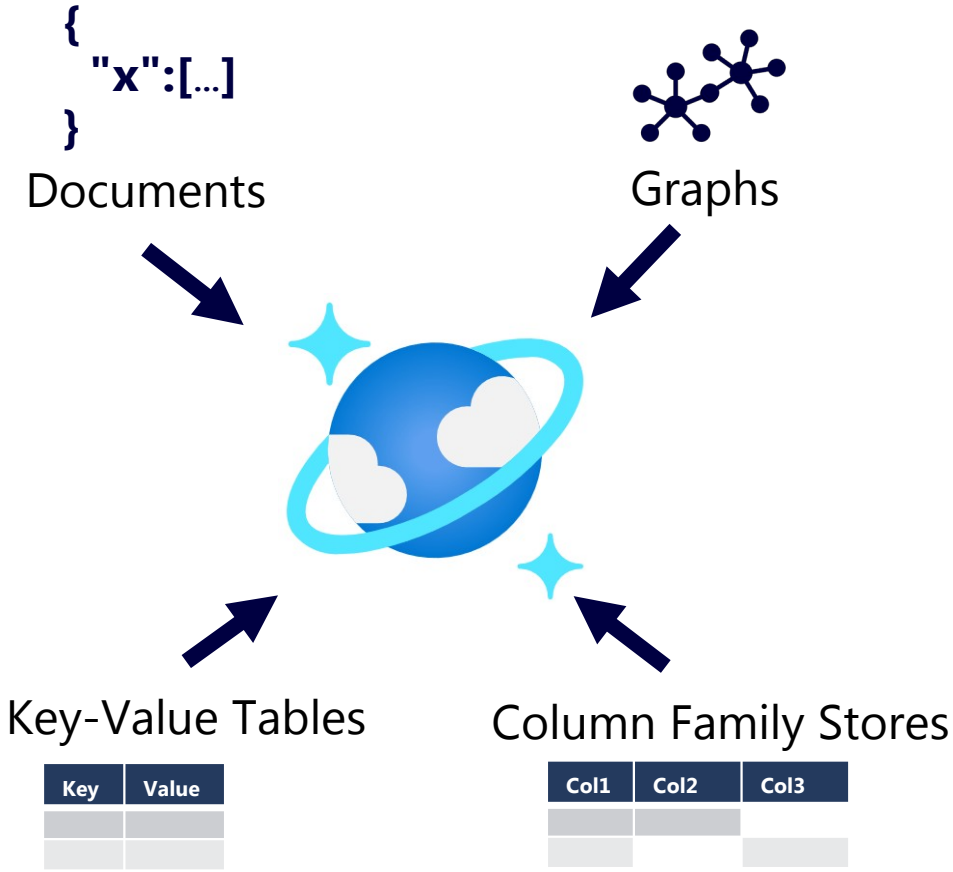
What is Azure Cosmos DB?

A multi-model, global-scale *NoSQL* database management system

- Support for multiple storage APIs
- Real time access with fast read and write performance
- Enable *multi-region writes* to replicate data globally; enabling users in specified regions to work with a local replica



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Azure Cosmos DB APIs

Azure Cosmos DB for NoSQL

- Native API for Cosmos DB

```
SELECT *
FROM customers c
WHERE c.id = "joe@litware.com"
```

```
{
   "id": "joe@litware.com",
   "name": "Joe Jones",
   "address": {
        "street": "1 Main St.",
        "city": "Seattle"
    }
}
```

Azure Cosmos DB for MongoDB

- Compatibility with MongoDB

```
db.products.find({ id: 123})
```

```
{
   "id": 123,
   "name": "Hammer",
   "price": 2.99}
}
```

Azure Cosmos DB for PostgreSQL

- Compatibility with PostgreSQL

id	name	dept	manager
1	Sue Smith	Hardware	Joe Jones
2	Ben Chan	Hardware	Sue Smith

Azure Cosmos DB for Table

- Key-value storage API
- Compatible with Azure Table Storage

PartitionKey	RowKey	Name
1	123	Joe Jones
1	124	Samir Nadoy

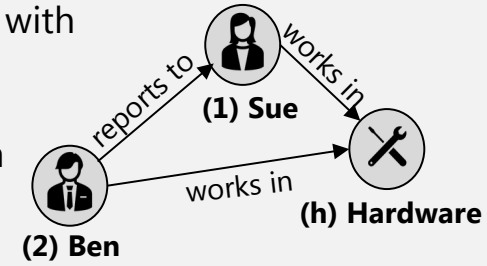
Azure Cosmos DB for Apache Cassandra

- Compatibility with Apache Cassandra

id	name	dept	manager
1	Sue Smith	Hardware	
2	Ben Chan	Hardware	Sue Smith

Azure Cosmos DB for Apache Gremlin

- Used to work with *graph* data
- *vertices* are connected via relationships (*edges*)



Lab: Explore Azure Cosmos DB

In this lab, you will provision and use Azure Cosmos DB

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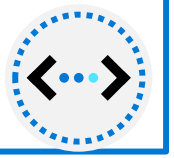

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2: Knowledge check

Which Cosmos DB API should you use to store and query JSON documents in Azure Cosmos DB?

- ☑ Azure Cosmos DB for NoSQL
- ☐ Azure Cosmos DB for Apache Cassandra
- ☐ Azure Cosmos DB for Table

Which Azure Cosmos DB API should you use to work with data in which entities and their relationships to one another are represented in a graph using vertices and edges?

- ☐ Azure Cosmos DB for MongoDB
- ☐ Azure Cosmos DB for NoSQL
- ☑ Azure Cosmos DB for Apache Gremlin

How can you enable globally distributed users to work with their own local replica of a Cosmos DB database?

- ☐ Create an Azure Cosmos DB account in each region where you have users
- ☐ Use the Table API to copy data to Azure Table Storage in each region where you have users
- ☑ Enable multi-region writes and add the regions where you have users

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Microsoft Azure

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